Nematology Circular No. 150
February 1988

Fla. Dept. Agric. & Consumer Serv.
Division of Plant Industry

NEMATODES OF ALFALFA (*MEDICAGO SATIVA* L.). II. STEM NEMATODE.

J. H. O'Bannon[1] and R. P. Esser[1]

The alfalfa stem nematode, ***Ditylenchus dipsaci*** (Kuhn, 1857) Filipjev, 1936 is a destructive pest primarily in irrigated regions of the U.S. or areas of high rainfall, but it may occur in other areas. The world wide distribution of the stem nematode is probably due to its ability to survive in dry plant debris which has accompanied poorly cleaned seed or in hay. Modern seed cleaning equipment has aided measurably in reducing the spread of nematodes in seed.

This nematode hatches from eggs and develops through 4 stages, any of which can infect the plant. They congregate under the developing leaflets, at or near the soil surface, and penetrate the young succulent stem or bud tissue. The nematode derives its name from a tendency to feed in stem instead of root tissue. Usually the base of an infected stem becomes swollen, discolored and roughened. This plant cell disruption causes swollen nodes and shortened internodes (Fig. 1). Cool damp weather is most favorable for stem nematodes since the alfalfa grows slowly but is very succulent. During warm weather the alfalfa stems elongate more rapidly and appear normal. Invasion by the nematode causes cell necrosis which extends down the stem and into the crown. Infected stems may blacken and are easily broken off. Examination of crushed infected stems or buds under a microscope reveals hundreds of nematodes in all stages of development from eggs to adults (Fig. 2).

The number of stems per crown is reduced as the alfalfa crown is damaged. With severe infestations the nematode may migrate into leaf tissue causing leaf curling and distortion. An interesting phenomenon associated with nematode infection is a condition called "white flagging" (Fig. 3). Some affected shoots, particularly regrowth after the first cutting, may be devoid of green color and appear as completely white leaves on scattered plants in a field. Mid summer populations of this nematode are usually quite low due to high temperatures.

In the field, dissemination of stem nematodes is by irrigation water, and by cultural practices such as mowing and raking. Nematode activity is favored by cool 60-70 F (15-20 C) temperatures and high moisture levels. Irrigation often produces conditions favoring infection. In 3 to 5 years stands become severely depleted (Fig. 4).

Ditylenchus dipsaci plays an important role in development of environmental complexes involving certain other disease organisms leading to increased incidence of disease.

---

[1]Chief of Nematology and Nematologist, respectively, Bureau of Nematology, P.O. Box 1269, Gainesville, FL 32602

Fig. 1. Center and right, typical stunted and swollen alfalfa stems caused by stem nematode infections, compared to a noninfected alfalfa stem on the left. (Courtesy of the Department of Nematology, University of California, Riverside.)

Fig. 2. Stained and cleared alfalfa stem showing masses of stem nematodes (dark stained) in tissue (Courtesy W. W. Carter.)

Fig. 3. Left, 'white flagging,' a typical symptom on alfalfa leaves seen in stem nematode infected fields. Right, close up of white flagging symptoms. (Courtesy G. D. Griffin.)

Fig. 4. A severely depleted alfalfa stand resulting from stem nematode infections. (Courtesy W. W. Carter.)

Disease Cycle

The alfalfa race of ***D. dipsaci*** is usually specific to alfalfa and does not readily transfer to other hosts. Nematodes in all stages of development are abundant in spring and fall but can be found throughout the growing season. Eggs are laid in infected plant tissue. Juveniles grow rapidly to the preadult which is the most infective stage. Preadult nematodes are able to withstand drying over long periods of time. Optimum temperature for invasion and reproduction in alfalfa is 15-20 C, and the life cycle can be completed in 19-23 days. Reproduction can occur from 5 to 30 C.

Preadults overwinter in the soil, in crop debris, and in the alfalfa crown. In cool, moist climates, usually in the early spring, nematodes move in a film of moisture to directly invade the buds. A film of moisture provides the only way for the nematodes to move about and work their way into the buds. Infestations are markedly reduced during dry, windy, or hot periods.

Management Considerations

Resistant varieties are the most practical means of combatting the stem nematode. Varieties such as Washoe and Lahontan are recommended in areas where they are adapted. Many privately developed varieties have moderate to high levels of resistance and are in general use.

Crop rotation with grains, beans, or sugar beets will reduce populations. However, reinfestation can occur in a short time when susceptible varieties are used, or through harvesting machinery, irrigation water, and use of waste water.

Burning is generally not recommended though fall burning of a field will decrease but not eliminate the nematode population. Spring burning may result in increased infection due to earlier initiation of bud growth and warmer soil temperatures.

Soil fumigants are not economically feasible when alfalfa is grown for hay production. However, when it is grown for seed, preplant soil fumigation would be economical where severe nematode problems have been encountered.

Fallow is not a good practice for eliminating populations since the preadult stage of this nematode can survive many months under dry conditions.

Detection

The stem nematode is not presently known to occur on alfalfa or any other crop grown in Florida. Even though alfalfa acreage is limited in the state, specialists should be aware of a potential problem that may occur with this pest. While this nematode is considered primarily a problem in more temperate climates, it has also adapted to warmer areas such as Arizona. If any unusual symptoms as described are observed, samples should be submitted to this laboratory for examination.

REFERENCE:

Griffin, G. D. 1984. Nematode parasites of alfalfa, cereals, and grasses. In Plant and Insect Nematodes (W. R. Nickle, ed.). Marcel Dekker, Inc., NY. Pp. 243-321.

Contribution No. 344, Bureau of Nematology

This publication was issued at a cost of $1830.87 or 0.41 per copy to provide information on proper recognition of plant pests. PI88T-55